REMARKS

Claims 1 to 20, as amended, appear in this application for the Examiner's review and consideration. The amendments are fully supported by the specification and claims as originally filed. In addition, the amendments to the independent claims add recitations that elaborate on the structure of the presently claimed invention, and, thus, do not affect the scope of the claims. The amendments only further clarify the claimed invention.

Claims 1 to 3, 10, 14 to 18, and 20 were rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over U.S. Patent No. 4,788,082 to Schmitt in view of Stickney et al., "Angular Distribution of Flow from Orifices and Tubes at high Knudsen Number," J. Fac. Sci. and Tech., 4, 10-17 (1967) (Stickney) for the reasons set forth on pages 5 to 7 of the Office Action; claims 4, 5, 6, 9, 11 and 12 were rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Schmitt in view of Stickney and further in view of U.S. Patent No. 6,498,605 to Shah et al. (Shah) for the reasons set forth on pages 7 and 8 of the Office Action; claims 7 and 8 were rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Schmitt in view of Stickney and Shah and further in view of Kirk-Othmer, Encyclopedia of Chemical Technology, Fourth Ed., Vol. 24, "Vacuum Technology," 750-53 (1997) (Kirk-Othmer) for the reasons set forth on pages 8 and 9 of the Office Action; and claims 13 and 19 were rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Schmitt in view of Stickney and Shah and further in view of U.S. patent No. 5,709,906 to Bickford et al. (Bickford) for the reasons set forth on pages 9 and 10 of the Office Action.

In response, Applicants submit that the presently claimed invention is directed to a method of depositing a patterned film of an organic material onto a substrate. The claimed method, as recited in claim 1, comprises mixing vapor of an organic material for deposition with a carrier gas. The carrier gas carrying the organic material for deposition is then introduced into a nozzle. The carrier gas carrying the organic material is ejected from the nozzle at a flow velocity that is at least 10 % of the thermal velocity of the carrier gas, such that the organic material introduced with the carrier gas into the nozzle is deposited onto a substrate, separated from the nozzle. The deposited organic material forms a patterned film of the organic material on the substrate. The patterned film comprises a plurality of pixels. A region between the nozzle and the substrate surrounding the carrier gas has a dynamic pressure of at least 1 Torr, and at least one of the nozzle diameter, the nozzle length, and nozzle-to-substrate separation is about equal to the gas mean free path length. The recitation

of claim 11 differs from that of claim 1, in that claim 11 recites providing a guard flow, but does not recite a dynamic pressure of 1 Torr.

Therefore, to be within the scope of the present claims, a reference must disclose or suggest:

1. Mixing vapor of an organic material for deposition with a carrier gas;

2. Introducing the carrier gas carrying the organic material for deposition into a nozzle; and

3. Ejecting the carrier gas carrying the organic material from the nozzle at a flow velocity that is at least 10 % of the thermal velocity of the carrier gas; where

a. The organic material introduced with the carrier gas into the nozzle is deposited on a substrate in a patterned film of the organic material;

b. The patterned film comprises a plurality of pixels; and

c. At least one of the nozzle diameter, nozzle length, and/or nozzle-to-substrate separation is about equal to the mean free path of the gas.

Schmitt does not disclose or suggest the presently claimed invention. For example, Schmitt does not disclose or suggest depositing a patterned film of organic material on a substrate, where the patterned film comprises a plurality of pixels. Instead, Schmitt discloses coating broad areas, such as providing an oxide coating on turbine blades. Column 1, lines 31 to 33. *See also*, column 2, lines 37 to 46.

In addition, Schmitt does not disclose or suggest mixing vapor of an organic material for deposition with a carrier gas, and introducing the carrier gas carrying the organic material for deposition into a nozzle, as presently claimed. For the reasons set forth below, Schmitt teaches away form introducing a carrier gas carrying an organic material for deposition into a nozzle, and, thus, teaches away from the presently claimed invention.

In contrast to the presently claimed invention, all of the embodiments disclosed by Schmitt require at least one of:

1. Mixing the condensible material for deposition with the carrier gas **in the nozzle** of the disclosed apparatus;

2. Forming the condensible material for deposition from reactive species in the carrier gas **in the disclosed nozzle**; or

3. Forming the condensible material for deposition from reactive species in the carrier gas **after ejection** of the carrier gas and reactive species **from the disclosed nozzle**.

Therefore, each of those embodiments disclosed by Schmitt requires that the condensible material to be deposited is mixed with or formed in the carrier gas after the

carrier gas is introduced into the nozzle. That is not the presently claimed invention. The present claims require the mixing of the vapor of the organic material with the carrier gas before the resulting mixture of vapor and gas is introduced into the nozzle.

As stated in the Amendment filed December 12, 2006, the only disclosure of the deposition of organic molecules by Schmitt is that found at column 30, lines 21 to 38, of that patent. There, Schmitt discloses that an organic material in bulk form may be heated to evaporate in a nozzle, so that the material is convected by an inert carrier gas flow, as illustrated in Fig. 5. Column 30, lines 22 to 25, and Fig. 5.

Alternately, Schmitt discloses that monomers may be synthesized in the gas phase, and allowed to polymerize during transport in the jet to the substrate, using the mechanism illustrated in Figs. 4 and 6, such that the polymerization occurs within the nozzle or after ejection from the nozzle. Column 30, lines 29 to 35, and Figs. 4 and 6. Thus, the deposited material is not mixed with a carrier gas before the material and carrier gas are introduced into the nozzle, as presently claimed. Schmitt clearly discloses that precursor molecules are not converted to condensible species until the precursor is introduced into the nozzle. Column 9, lines 43 to 50. Schmitt also discloses that precursor molecules that are not deposited on the substrate are pumped out of the apparatus. Column 8, lines 44 to 46.

Specifically, as illustrated in Fig. 4, Schmitt discloses precursor molecules that are mixed with the carrier gas are introduced into region R1, and then acted upon to synthesize a condensible species. Column 9, lines 44 to 51. Thus, condensible are only produced after the precursor molecules, which cannot be deposited, are introduced into the nozzle.

In the apparatus and method illustrated in Fig. 5, Schmitt discloses a carrier gas 1-3 that is introduced into a nozzle 1-1 through an inlet 1-6. Column 3, lines 13, 14, and 34 to 40. The solid or liquid material for deposition 5-1, represented by the large open circle in Fig. 5, is held in place in the flowfield in the nozzle, and heated to evaporate or sublime molecules that are entrained in the flow of carrier gas through the nozzle. Column 3, lines 40 to 48. The precursor species is held in place directly in the gas flow 1-3 in nozzle 1-1 at region R1. Column 9, lines 58 to 67.

In the apparatus and method illustrated in Fig. 6, Schmitt discloses reactant species 6-1 in the gaseous or liquid phase that are introduced in to the carrier gas flow 1-3 in the jet via a thin tube 6-2, which exits in region R1 of the flow at the nozzle exit region. Column 3, lines 8 to 10 and 49 to 57, and Figs. 1, 3 and 6. The reactant species that are injected by the thin tube 6-2 into the flow region R1 are entrained in the flow of the carrier gas 1-3 in the

nozzle 1-1. Column 9, line 67, to column 10, line 2. That is, Schmitt discloses that region R1 as that portion of the flow region that is in and around the nozzle exit.

Schmitt clearly teaches that one of the main advantages of the disclosed apparatus and methods is that premature condensation of the deposition material is avoided. See column 7, lines 39 to 43, column 8, lines 23 to 36, column 9, lines 24 to 28 and 34 to 37, and column 16, lines 9 to 18. Deposition on the nozzle is avoided by the introduction or synthesis of the depositing species near the center of the jet in region R1, such that there is no time for diffusion of those species to the walls of the apparatus. *See, e.g.,* column 8, lines 22 to 27. The depositing species are ejected from the nozzle to the substrate before deposition on the apparatus can occur.

Therefore, Schmitt teaches away form the presently claimed invention. One of ordinary skill in the art following the teaching of Schmitt would not mix vapor of an organic material for deposition and a carrier gas, and then introduce the carrier gas carrying the organic material for deposition into a nozzle, as Schmitt discloses that the depositing species must be introduced into the carrier gas in flow region R1 of the nozzle to prevent deposition of the depositing species on the walls of the apparatus. Accordingly, one of ordinary skill in the art would not modify the method disclosed by Schmitt to obtain the presently claimed method. Modifying the disclosure of Schmitt to obtain the presently claimed invention would render the disclosure of Schmitt inoperative for its intended purpose.

In addition, as discussed above, Schmitt does not disclose or suggest depositing a patterned film of an organic material on a substrate, where the patterned film comprises a plurality of pixels, as presently claimed. Therefore, Schmitt does not disclose or suggest the presently claimed invention.

Stickney does nothing to overcome the deficiencies of Schmitt. Stickney discloses an investigation of the flow of cesium atoms from orifices and tubes into vacuum. *See* the abstract. Particular attention was given to the mean-free molecule flow regime, where the Knudsen number, defined as λ/D, the ratio of the mean-free path and the orifice or tube diameter, is on the order of unity. Page 10, first paragraph. As will be understood by one of ordinary skill in the art, the free molecule flow regime is the regime in which there are few if any molecular collisions in the flow. This is exactly the opposite of what is required in the processes disclosed by Schmitt.

Stickney does not disclose or suggest mixing vapor of an organic material for deposition with a carrier gas, introducing the carrier gas carrying the organic material for deposition into a nozzle, and ejecting the carrier gas carrying the organic material from the

nozzle, such that the organic material introduced with the carrier gas into the nozzle is deposited in a patterned film of the organic material onto a substrate, where the patterned film comprises a plurality of pixels, and where at least one of the nozzle diameter, nozzle length, and/or nozzle-to-substrate separation is about equal to the mean free path of the gas, as presently claimed. Even if one of ordinary skill in the art combined the disclosures of Schmitt and Stickney, the resulting combination would not provide the presently claimed invention.

Moreover, as discussed above, one of ordinary skill in the art following the disclosure of Schmitt would not modify the method disclosed by Schmitt by mixing vapor of an organic material for deposition with a carrier gas, and introducing the carrier gas carrying the organic material for deposition into a nozzle, as presently claimed. Schmitt discloses that the depositing species must be introduced or synthesized within the nozzle or after exiting the nozzle to avoid condensation on the walls of the apparatus. Therefore, Schmitt and Stickney, whether taken alone or in combination, do not disclose or suggest the presently claimed invention.

Shah does nothing to overcome the deficiencies of Schmitt and Stickney. Shah discloses a deposition process for coating a substrate with an ultrasonically generated aerosol spray. Column 1, lines 16 to 18. Shah discloses that a shroud gas may be used to screen and shape the aerosol spray. Column 3, line 52, to column 4, line 6.

Shah does not disclose or suggest mixing vapor of an organic material for deposition with a carrier gas, introducing the carrier gas carrying the organic material for deposition into a nozzle, and ejecting the carrier gas carrying the organic material from the nozzle, such that the organic material introduced with the carrier gas into the nozzle is deposited in a patterned film of the organic material onto a substrate, where the patterned film comprises a plurality of pixels, and where at least one of the nozzle diameter, nozzle length, and/or nozzle-to-substrate separation is about equal to the mean free path of the gas, as presently claimed. Therefore, even if the disclosure of Shah was combined with that of Schmitt and Stickney, the combination would not provide the presently claimed invention. Therefore, those references, whether taken alone or in combination, do not disclose or suggest the presently claimed invention.

Kirk-Othemer does nothing to overcome the deficiencies of Schmitt, Stickney, and Shah. Kirk-Othmer is an Encyclopedia of Chemical Technology that discloses that a pressure of less than 0.1 Torr is possible with vacuum technology. Kirk-Othmer does not disclose or suggest mixing vapor of an organic material for deposition with a carrier gas, introducing the

carrier gas carrying the organic material for deposition into a nozzle, and ejecting the carrier gas carrying the organic material from the nozzle, such that the organic material introduced with the carrier gas into the nozzle is deposited in a patterned film of the organic material onto a substrate, where the patterned film comprises a plurality of pixels, and where at least one of the nozzle diameter, nozzle length, and/or nozzle-to-substrate separation is about equal to the mean free path of the gas, as presently claimed. Even if one of ordinary skill in the art combined the disclosures of Kirk-Othmer with those of the other cited references, the resulting combination would not provide the presently claimed invention. Therefore, those references, whether taken alone or in combination, do not disclose or suggest the presently claimed invention.

Bickford does nothing to overcome the deficiencies of Schmitt, Stickney, and Shah. Bickford discloses a method of conditioning halogenated polymeric materials, where the method may be performed in a glove box that may be purged with an inert gas. Bickford does not disclose or suggest mixing vapor of an organic material for deposition with a carrier gas, introducing the carrier gas carrying the organic material for deposition into a nozzle, and ejecting the carrier gas carrying the organic material from the nozzle, such that the organic material introduced with the carrier gas into the nozzle is deposited in a patterned film of the organic material onto a substrate, where the patterned film comprises a plurality of pixels, and where at least one of the nozzle diameter, nozzle length, and/or nozzle-to-substrate separation is about equal to the mean free path of the gas, as presently claimed. Even if one of ordinary skill in the art combined the teaching of Bickford with those of the other cited references, the resulting combination would not provide the presently claimed invention. Therefore, those references, whether taken alone or in combination, do not disclose or suggest the presently claimed invention.

Therefore, as Schmitt, Stickney, Shah, and Kirk-Othmer, whether taken alone or in combination, do not disclose or suggest the presently claimed invention, the present claims are not obvious over those references. Accordingly, it is respectfully requested that the Examiner withdraw the rejections of the claims over those references under 35 U.S.C. § 103(a).

Applicants thus submit that the entire application is now in condition for allowance, an early notice of which would be appreciated. Should the Examiner not agree with Applicants' position, a personal or telephonic interview is respectfully requested to discuss any remaining issues prior to the issuance of a further Office Action, and to expedite the allowance of the application.

No fee is believed to be due for the filing of this Amendment. Should any fees be due, however, please charge such fees to Deposit Account No. 11-0600.

Respectfully submitted,

KENYON & KENYON

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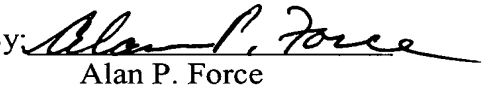
By: 

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